

DESIGN MEMORANDUM

ON

APPONAUG COVE, RHODE ISLAND

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U. S. ARMY ENGINEER DIVISION, NEW ENGLAND

CORPS OF ENGINEERS

WALTHAM 54, MASSACHUSETTS

1 February 1963

U. S. ARMY ENGINEER DIVISION, NEW ENGLAND  
CORPS OF ENGINEERS  
424 Trapelo Road  
Waltham 54, Mass.

Refer to File No. NEDGW

1 February 1963

SUBJECT: Design Memorandum for Apponaug Cove, Rhode Island

TO: Chief of Engineers  
ATTENTION: ENGCW-E  
Department of the Army  
Washington 25, D. C.

1. Reference is made to letter of 26 October 1961, Subject: Work Allowances for Small Authorized Projects, which provided funds in the amount of \$14,000 for preconstruction planning including preparation of design memorandum, on Apponaug Cove, Rhode Island.

2. In accordance with EM 1110-2-1150, Engineering and Design, Definite Project Studies, dated 15 January 1962, there are inclosed four (4) copies of the design memorandum on the subject project. The work to be undertaken involves dredging operations with no special design or excavation problems. The design memorandum is approved in accordance with paragraph 6(b) of the above referenced authority.

3. Planning on this project is about 90% complete. Requirements of local cooperation have been met. It is requested that funds in the amount of \$175,000 be allocated for construction so that bids may be taken in February as scheduled.

1 Incl  
Design Memo (in quad)

PETER C. HYZER  
Colonel, Corps of Engineers  
Division Engineer

U. S. ARMY ENGINEER DIVISION, NEW ENGLAND  
CORPS OF ENGINEERS  
424 Trapelo Road  
Waltham, Massachusetts

NEDGW

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DESIGN MEMORANDUM  
ON  
APPONAUG COVE, RHODE ISLAND

PERTINENT DATA

1. A summary of the physical features and costs of the existing project for Apponaug Cove, Rhode Island is as follows:

<u>Features</u>	<u>Present Estimate (1963)</u>
Dredge 6-foot channel and anchorage	\$322,000 *

\* Includes \$126,000 local cash contribution and \$7,000 for preauthorization studies

PROJECT AUTHORIZATION

2. Authorization. - The uncompleted project for the improvement of Apponaug Cove, authorized by the River and Harbor Act of 14 July 1960, provides for: a channel 100 feet wide and 6 feet deep from that depth in Greenwich Bay to a point at the head of the middle basin 200 feet east of the New York, New Haven and Hartford railroad bridge, and a 10-acre anchorage basin, 6 feet deep, southwest of the channel in the middle basin.

3. The project was authorized subject to the requirements that local interests, prior to construction, agree to: (a) Contribute in cash 40 percent of the cost of construction, and that such contribution be paid in a lump-sum prior to commencement of such construction, the final allocation of cost to be made after actual costs have been determined; (b) provide without cost to the United States all lands, easements, rights-of-way and suitable spoil-disposal areas for the construction and subsequent maintenance of the project, when and as required; (c) hold and save the United States free from damages due to the construction and

maintenance of the project; and (d) provide and maintain a suitable public landing with adequate supply facilities, in accordance with plans approved by the Chief of Engineers, and the necessary mooring facilities in the anchorage area, the landing and mooring facilities to be open to all on equal terms.

4. There was no Federal project for Apponaug Cove prior to authorization in 1960 of the project under design in this design memorandum. No work has been initiated on this project.

#### INVESTIGATIONS

5. Physical investigations carried out in support of the survey report contained in House Document 143, 86th Congress, 1st Session, are as follows:

a. Hydrographic and topographic surveys were made in March 1957.

b. Probings were made in March 1957.

c. Subsequent to project authorization, data in the survey report was supplemented by further hydrographic and topographic surveys. Also borings were made to determine the existing depths and character of materials to be removed from the project area.

6. Two public hearings have been held subsequent to project authorization to inform and to obtain information from local people relative to disposition of the dredged fill. At the time of the first hearing disposal of the dredged material was contemplated by hydraulic method behind diking. Analyses made of the borings revealed that the material in the middle basin would not stand on the 1:20 slope if placed along the Basin shore as contemplated in the survey report. Subsequently detailed dike design criteria to retain the material in this area indicated a prohibitive cost for dike construction, such that the project cost would exceed the cost that would be incurred if the material were dredged by bucket dredge and disposed of at sea. Local interests were advised and asked to provide alternate spoil areas that would be economically feasible for hydraulic disposal. However, the only area sufficient to hold the amount of material to be dredged was not acceptable due mainly to objections imposed by State of Rhode Island Division of Fish and Game and U. S. Fish & Wildlife Service relative to the severe damage that would be occasioned to wildlife habitat. Other scattered areas available were insufficient to take more than half of the material to be dredged. The feelings of the majority of people who attended the second hearing were expressed by the Mayor of Warwick in which he

requested that the material to be dredged be disposed of in approved deep water dumping grounds as the most economical and, in fact, the only practicable manner of disposal of the dredged material.

#### LOCAL COOPERATION

7. The requirements of local cooperation are stated in paragraph 3 above. The required Assurances have been signed by the authorized officials. The local cash contribution of \$126,000 has been deposited to the credit of the "Treasurer of the United States." Monies have been appropriated by the City of Warwick and the State of Rhode Island to provide for construction of the public landing. The necessary easements required to permit spoiling of material on the area originally selected for disposal in the middle basin were obtained; however, as indicated above this area is no longer being considered as a possible spoil area. Numerous conferences were held with local officials during the planning phase of the general plans to coordinate the views and concurrence of local interests. The names of the principal officers and representatives contacted during the pre-construction planning phase are listed below:

Former Governor John Nette, State House, R. I.  
Mayor Horace E. Hobbs, City Hall, Apponaug, R. I.  
Mr. Henry Isé, Chief, Harbors & Rivers Division, State Office Building, Providence, R. I.  
Mr. Glenn Kumekawa, Director, City Planning, City Hall, Apponaug, R. I.  
Mr. Charles Dickerson, Chairman, Waterfront Development Commission, Apponaug, R. I.

#### LOCATION OF PROJECT AND TRIBUTARY AREA

8. Apponaug Cove, a northwest arm of Greenwich Bay, is in Warwick, Rhode Island, about 10 miles south of Providence. The cove, which is divided into three areas known as outer, middle and inner basins, is about 1 mile long with widths varying from 100 to 1600 feet and depths ranging up to 8 feet. Local interests have built a number of wharves and other navigation facilities including a marina and a small-boat launching ramp. The cove is crossed by a railroad bridge about 0.8 mile above the entrance. Apponaug Cove lies entirely within the City of Warwick, a rapidly growing manufacturing center producing chemicals, adhesives, textiles, and screw machine products. The area tributary to the cove is primarily a residential section with commercial and industrial development confined to the village of Apponaug. The cove is used by fishermen who serve four wholesale fish terminals in the harbor, and by the owners of local and transient recreational craft. The fishing

commerce currently amounts to about 850 tons annually. About 100 fishing vessels and 250 recreational craft make numerous trips in and out of the cove during the year.

#### PROJECT PLAN

9. The project is basically the same as shown in the authorizing document, HD 143/86/1, and provides for a channel 100 feet wide and 6 feet deep from that depth in Greenwich Bay to a point at the head of the middle basin 200 feet east of the New Haven railroad bridge, and a 10-acre anchorage basin, 6 feet deep, southwest of the channel in the middle basin. Project costs determined in the authorizing document were estimated on dredging quantities in terms of in-place measurement and provided for dredging to a 6-foot depth plus an allowance of 1 foot overdepth. Side slopes of 1 on 3 were used. The project plan is shown on the attached map.

10. The plan of improvement described above is considered to be the most feasible plan to provide desirable accommodations for the present and prospective fishing and recreational fleets and would eliminate some objectionable tidal flats. The proposed work will be undertaken by bucket dredging with disposal in approved deep water dumping grounds which is the most economical method for this project.

#### DEPARTURES FROM PROJECT DOCUMENT PLAN

11. A modification of the document plan necessitated by the recent construction of a marina on the east side of Arnold's Neck would shift the entrance channel approximately 100 feet easterly. The permit application for this work was approved after quantity estimates revealed no additional volume of dredging would be required. No change is contemplated in the 1-foot overdepth. A departure in method of disposal from document plan is explained under "Investigations."

#### COST ESTIMATES

12. The current estimate of cost is based on quantities determined from hydrographic surveys including probings made in April 1962 and borings made in January 1962 and includes an allowance of one foot of overdepth dredging to provide for inaccuracies in dredging operations. The amount of overdepth dredging is estimated at 35,000 cubic yards. The estimated cost of dredging is based on the use of a bucket dredge and prices prevailing in January 1963. The work will require removal of approximately 190,000 cubic yards of ordinary material to be spoiled as described in paragraph 10 above.

13. Current Estimate of Costs (January 1963). -

Dredging 6' channel and 6' anchorage 190,000 c.y. ordinary material @ \$1.31 c.y.	\$250,000
Contingencies . . . . .	25,000
Preauthorization Studies . . . . .	7,000
Engineering and Design . . . . .	14,000
Supervision and Administration . . . . .	26,000
Total	\$322,000

14. Comparison of Costs. -

	Document Estimate (May 1958)	Latest Approved Estimate (July 1962)	Current Estimate (Jan 1963)
Dredging including Contingencies . . . . .	\$275,000	\$275,000	\$275,000
Preauthorization Studies. .	7,000	7,000	7,000
Engineering and Design . .	5,000	14,000	14,000
Supervision and Adminis- tration . . . . .	20,000	26,000	26,000
Totals	\$307,000	\$322,000	\$322,000

15. Allocation of Costs. -

	Document Estimate (May 1958)	Latest Approved Estimate (July 1962)	Current Estimate (Jan 1963)
<u>Federal</u>			
Dredging including Contingencies	-----	\$165,000	\$165,000
Preauthorization Studies . . . . .	7,000	7,000	7,000
Engineering and Design . . . . .	-----	8,000	8,000
Supervision & Administration . .	-----	16,000	16,000
Total Fed (C. of E. Costs) . .	\$187,000*	\$196,000	\$196,000
Aids to Navigation . . . . .	3,000	3,000	3,000
Totals	\$190,000	\$199,000	\$199,000

\* Not broken down in authorizing document.

	Document Estimate (May 1958)	Latest Approved Estimate (July 1962)	Current Estimate (Jan 1963)
<u>Non-Federal</u>			
Dredging including Contingencies	-----	\$110,000	\$110,000
Preauthorization Studies . . . . .	-----	0	0
Engineering and Design . . . . .	-----	6,000	6,000
Supervision & Administration . . .	-----	10,000	10,000
	<u>\$120,000*</u>	<u>\$126,000</u>	<u>\$126,000</u>
Public Landing . . . . .	30,000**	33,000**	30,000**
Total Non-Federal Costs	<u>\$150,000</u>	<u>\$159,000</u>	<u>\$156,000</u>

<u>Total</u>			
Construction Cost (excl. preauth. studies, aids to navigation and public landing) . . . . .	\$300,000	\$315,000	\$315,000

\* Not broken down in authorizing document  
 \*\* Self-liquidating

#### SCHEDULES FOR DESIGN AND CONSTRUCTION

16. Construction of the project requires the removal and disposal of about 190,000 cubic yards of ordinary material estimated to require approximately 4.5 months of dredging operations. Field investigations consisting of detailed topographic and hydrographic surveys including probings and borings are used as a basis for this design memorandum and the bidding documents.

17. The schedule for construction of the project follows:

- a. Issue plans and specifications . . . . . 12 Feb 1963
- b. Open bids . . . . . 28 Feb 1963
- c. Award contract . . . . . 6 March 1963
- d. Start construction . . . . . 21 March 1963
- e. Complete construction . . . . . 7 Aug 1963

18. The construction will be accomplished by contract work.

#### Fund Requirements:

Allotted to date . . . . .	\$21,000*
Additional funds required to complete	<u>\$175,000</u>

\* Includes \$7,000 preauthorization study costs



## OPERATION AND MAINTENANCE

19. Maintenance of the project is the responsibility of the United States. Maintenance will consist of periodic dredging to restore project depths within the limits of the authorized Federal project. The annual maintenance cost is estimated at \$11,300 based on an average annual deposition over the dredged area of 4,500 cubic yards and exclusive of annual maintenance to navigation aids.

### BENEFITS

20. Benefits expected to accrue from the completed project have been estimated for a prospective fleet of over 500 small recreational and commercial fishing craft. Land enhancement benefits which were evaluated in the project document, based on hydraulic disposal of dredged fill, have been eliminated from the following summary due to changed disposal method.

#### Benefits

Commercial fishing . . . . .	\$12,000
Recreational boating . . . . .	<u>\$38,000</u>
Total	\$50,000

21. Annual charges computed in the authorizing document were based on a 50-year project life and interest rate of  $2\frac{1}{2}\%$  on both the Federal and non-Federal investment. Current annual charges are computed on a 50-year project life at an interest rate of  $2-7/8\%$  on the Federal investment and 3% on the non-Federal investment. The non-Federal investment is exclusive of the estimated cost of the public landing which is considered self-liquidating.

#### Annual Charges

	<u>Federal</u>	<u>Non-Federal</u>	<u>Total</u>
Investment. . . . .	\$199,000	\$126,000	\$325,000
Project Life. . . . .	50 years	50 years	
Interest Rate . . . . .	$2-7/8\%$	3%	
Interest & Amortization . . .	7,550	4,900	12,400
Maintenance . . . . .	11,700	0	11,700*
Total Annual Charges . .	\$ 19,250	\$ 4,900	\$ 24,100

\* Includes \$400 for navigation aids.

22. A comparison of estimated annual benefits of \$50,000 to estimated annual charges of \$24,100 yields a current benefit-cost ratio of 2.1 to 1.

#### RECOMMENDATIONS

23. The plan of improvement proposed in this design memorandum provides for an entrance channel 100 feet wide and 6 feet deep from that depth in Greenwich Bay to a point 200 feet east of the New York, New Haven & Hartford Railway Bridge in the middle basin, and a 10-acre anchorage basin, 6 feet deep southwest of the channel in the middle basin. This project plan will adequately serve the needs of present and prospective navigation activity in the cove and is adequately justified. It is recommended that the project be constructed as described.

Incl: Maps (2)



